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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/823,616	03/31/2001	Simon Knee	42390.P9020	6040

7590 10/22/2004

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EXAMINER

BILGRAMI, ASGHAR H

ART UNIT	PAPER NUMBER
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2143

DATE MAILED: 10/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/823,616	<b>Applicant(s)</b> KNEE ET AL.	
	<b>Examiner</b> Asghar Bilgrami	<b>Art Unit</b> 2143	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-32 are rejected under 35 U.S.C. 102(e) as being anticipated by Hunter et al (U.S. Pub No 2002/0059197 A1).

3. As per claim 1, 16 & 23 Hunter disclosed a method of performing a longest match search comprising: receiving a search key; determining a set of masks that when applied to the search key are known to have a potential for matching an entry in a routing table (page 1, paragraphs 4 & 6); forming a routing table query based upon the search key and a longest mask of the set of masks; and applying the routing table query to the routing table (page 2, paragraph 33 & page 4, paragraph 48).

4. As per claim 2 & 24 Hunter disclosed the method of claim 1, further comprising: removing the longest mask from the set of masks; and continuing to apply additional routing table queries until either the set of masks is empty or a matching entry is found in the routing table (page 4, paragraph 48).

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5. As per claim 3 & 25 Hunter disclosed the method of claim 1, wherein the search key comprises an Internet Protocol (IP) address (page 1, paragraphs 6).
6. As per claim 4 & 20 Hunter disclosed the method of claim 3, wherein the IP address comprises a destination address (page 4, paragraphs 51).
7. As per claim 5 & 21 Hunter disclosed the method of claim 3, wherein the IP address comprises a source address (page 4, paragraphs 51).
8. As per claim 6, 9, 18, 26 & 30 The method of claim 1, wherein said determining a set of masks comprises retrieving an encoded mask vector from a mask table based upon the search key, the encoded mask vector having N bits and capable of identifying N different length masks (page 6, paragraph 73).
9. As per claim 7, 17 & 27 Hunter disclosed the method of claim 1, wherein the longest mask of the set of masks is determined by the following equation:  $\text{Mask} = (\text{MaskWord} - \text{MaskWord}) / \text{Mask Word}$ , where: Mask Word is an encoded mask vector, and Mask is the longest mask identified by Mask Word (page 4, paragraphs 55 & 56).
10. As per claims 8 & 29 Hunter disclosed a packet forwarding device comprising: a plurality of ports upon which packets are received and transmitted; a routing processor coupled to the plurality of ports to determine an egress port of the plurality of ports for a packet received on an

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ingress port of the plurality of ports by performing a longest match search comprising one or more routing table queries; a routing table, coupled to the routing processor, to provide the routing processor with a match indication and information regarding a matching routing table entry, if any, of a plurality of routing table entries stored therein in response to a routing table query; and a mask table, coupled to the routing processor, to maintain encoded mask vectors identifying mask lengths of the plurality of routing table entries (page 3, paragraphs 41 & 42).

11. As per claims 10 & 31 Hunter disclosed the packet forwarding device of claim 8, wherein the routing table comprises a Content Addressable Memory (CAM) (page 3, paragraph 44).

12. As per claim 11 & 32 Hunter disclosed the packet forwarding device of claim 8, wherein the one or more routing table queries are formed by applying a series of masks determined with reference to the mask table to a search key extracted from the received packet (page 2, paragraph 33).

13. As per claim 12 & 19 Hunter disclosed a method of forwarding a packet comprising: receiving a packet on an ingress port of a plurality of ports; extracting a destination Internet Protocol (IP) address from a header of the packet; using a portion of the destination IP address to index into a mask table to retrieve an encoded mask vector that identifies a series of masks to be applied to the destination IP address during a longest match search of a routing table, the series of masks representing those masks that are known to have a potential for matching an entry in the routing table when applied to the destination IP address (page 3, paragraphs 41 & 42);

identifying a longest matching entry in the routing table by performing the longest match search based upon the destination IP address and one or more of the series of masks; and forwarding the packet to a network device associated with the destination IP address via an egress port of the plurality of ports identified by the longest matching entry (page 4, paragraph 48).

14. As per claim 13 Hunter disclosed the method of claim 12, wherein the portion of the destination IP address comprises the most significant N bits of the destination IP address (page 6, paragraph 73).

15. As per claim 14 & 22 Hunter disclosed the method of claim 12, wherein the encoded mask vector includes a plurality of mask length indicator bits that each indicate a mask length by virtue of their position within the encoded mask vector (page 4, paragraph 54).

16. As per claim 15 Hunter disclosed the method of claim 12, further comprising updating the mask table to include a new encoded mask vector in response to receiving a new routing table entry (page 5, paragraph 65).

17. As per claim 28 Hunter disclosed the method of claim 7, further comprising: isolating an endbit of the longest mask; combining the longest mask with the inversion of the longest mask left-shifted one position; and forming a subsequent routing table query based on the masked search key left shifted one position and the endbit (page 6, paragraph 68).

*Conclusion*

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Srinivasan (U.S. Pub 2003/0131188A1) disclosed synchronous content addressable memory.

Chien (U.S. Pub 2003/0115345 A1) disclosed methods and apparatus for masking destination addresses to reduce traffic over a communications link.

Henderson (U.S. Pub No 2004/0015648) disclosed boundary addressable memory.

Tzeng (U.S. Pat 6,067,574) disclosed high speed routing using compressed tree process.

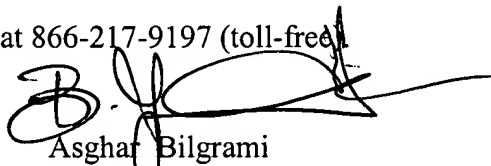
Feldmeier (U.S. Pub 2004/0039845) disclosed partially-ordered CAMS used ternary hierarchical address searching/sorting.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asghar Bilgrami whose telephone number is 703-305-4623. The examiner can normally be reached on M-F, 8:00-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wiley can be reached on 703-308-5221. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Asghar Bilgrami

Examiner  
BUNJOS JARDENCHONWANT  
Art Unit 2143  
PRIMARY EXAMINER

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